USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003OR31B

Title: Environmental Analysis of Wastewater Effluents and Biosolids-derived Endocrine Disuptiong Chemicals in the Willamette River

Project Type: Research

Focus Categories: Toxic Substances, Non Point Pollution, Water Quality

Keywords: endocrine disruptors, Internet, databases, hydrology, watersheds, water quality, public education

Start Date: 2/15/2003

End Date: 2/14/2004

Federal Funds Requested: $15000.00

Matching Funds: $33301.00

Congressional District: Oregon 5th

Principal Investigators: Kassim, Tarek A.

Abstract: Some compounds released into the environment through wastewater effluents and/or biosolids applied as soil amendments can mimic or modulate endogenous hormones and have been termed endocrine-disrupting chemcials (EDCs). EDCs have been defined as exogenous agents that interfere with the "synthesis, secretion, transport, binding, action, or elimination of natural hormones in the body that are responsible for the maintenance of homeostasis, reproduction, development, and/or behavior". It has been hypothesized that such compounds may elicit a variety of adverse effects in both humans and wildlife, including promotion of hormone-dependent cancers, reproductive tract disorders, and reduction in reproductive fitness. The generation and disposal of biosolids and wastewater effluents produced at municipal wastewater treatment plants is a major environmental issue. For example, approximately 900 kg of biosolids on a dry basis are produced from the treatment of 1 million gallons of wastewater. These solids are typically dewatered on site and disposed of at landfills, incinerators or on agricultural fields. Disposal of sewage sludge on agricultural fields recycles the nutrients captured from municipal wastewater into agricultural soils. However, biosolids applied as soil amendments can contain significant quantities of endocrine disrupting chemicals derived from the municipal wastewater or organic

metabolites produced during waste treatment. These organics have the potential to adversely impact soil receiving the biosolids, surface and groundwater in the vicinity of application, on crops grown on sludge-amended soils, and on animals and humans that may consume the crops grown on the soils. In addition, wastewater effluents are considered to be the main contributors of EDCs to the aquatic environment. The Willamette River is the 10th largest river in the United States and the heart of Oregon. A recent investigation by the USGS National Water Quality Assessment (NAWQA) program has found that several fish species are dying or have deformations, as well as evidence of endocrine disruption in common carp and largemouth bass collected from the river. In additon, another investigation, carried out by the Principal Investigator and funded by the USGS, has indicated the presence of several EDCs in the river. Accordingly, the present proposal aims at analyzing the occurrence and characterizing a comprehensive list of endocrine-disrupting chemicals (EDCs) that are introduced into Willamette River through both effluents and biosolids generated from five major wastewater treatment plants (e.g., Eugene, Corvallis, Albany, Salem and North Portland). The expected findings of the proposed study will complement the understanding of the chemodynamics and control of EDCs in the river.
